Technical training.
Product information.

G12 Navigation System

BMW Service

General information

Symbols used

The following symbol is used in this document to facilitate better comprehension or to draw attention to very important information:

⚠

Contains important safety information and information that needs to be observed strictly in order to guarantee the smooth operation of the system.

Information status and national-market versions

BMW Group vehicles meet the requirements of the highest safety and quality standards. Changes in requirements for environmental protection, customer benefits and design render necessary continuous development of systems and components. Consequently, there may be discrepancies between the contents of this document and the vehicles available in the training course.

This document basically relates to the European version of left hand drive vehicles. Some operating elements or components are arranged differently in right-hand drive vehicles than shown in the graphics in this document. Further differences may arise as the result of the equipment specification in specific markets or countries.

Additional sources of information

Further information on the individual topics can be found in the following:

- Owner's Handbook
- Integrated Service Technical Application.

Contact: conceptinfo@bmw.de

©2015 BMW AG, Munich

Reprints of this publication or its parts require the written approval of BMW AG, Munich

The information contained in this document forms an integral part of the technical training of the BMW Group and is intended for the trainer and participants in the seminar. Refer to the latest relevant information systems of the BMW Group for any changes/additions to the technical data.

Information status: **June 2015**
BV-72/Technical Training

G12 Navigation System
Contents

G12 Navigation System
Contents

G12 Navigation System
1. Introduction

A high-end navigation system the Navigation Professional system (SA 609) is offered for the G12 as standard equipment in the US market. The heart of the **hardware** is the next generation Head Unit High 2. All calculations of the navigation system are performed in this unit. The reception and sensor electronics components were distributed among several control units in the G12.

The 3-year subscription introduced with the F23 for **map data updates** is also fully implemented for the G12. There are also new challenges for the service organization.

In terms of **navigation hardware**, the navigation system consists of a fixed 12.3" central information display (CID) with touch screen with a resolution of 1440 x 540 pixels, the Head Unit High 2 HU-H2 and the iDrive controller CON.

With regards to **operation**, the iDrive controller with rotary and push-button function and the touch-sensitive surface with handwriting detection (iDrive Touch Controller) are standard options for the US market. The favorite buttons on the head unit have a new feature as well as the **touch screen operation** on the central information display (CID).

There are also a host of new features for the **navigation functions** in the G12. These relate to the areas of map view, destination input, display (guiding), routing and the special functions for navigation. The highlights include the newly designed Micro City Map with a scale of up to 10 m, the learning navigation function, the route magnet and route visualization by means of an aerial view.

In addition, control of the navigation system via the **voice processing system (SVS)** was significantly improved in the G12. The modified visual/acoustic feedback of the SVS in the vehicle facilitates operation. A new feature is an additional off-board version of the voice processing system via the SIM card permanently installed in the vehicle. Like with SIRI® from Apple® or the **"Speech to text" function** (Message Dictation by Nuance®) introduced at BMW in 2012, the off-board SVS is processed by an external provider and transmitted back to the vehicle in seconds. You can find out about the differences between the individual embedded (onboard) and off-board SVS versions in this training manual.

A main application area for the **voice processing system (SVS)** with its embedded (hard disk) and off-board (BMW backend) services is navigation. That is why the topic of SVS, which has hardware components distributed throughout the vehicle, is covered in this training manual. You can find out about the new and distinguishing features in the area of embedded/off-board SVS and natural language understanding here.

G12 Navigation System

2. System Overview

2.1. System network

2.1.1. Bus overview

G12 bus overview
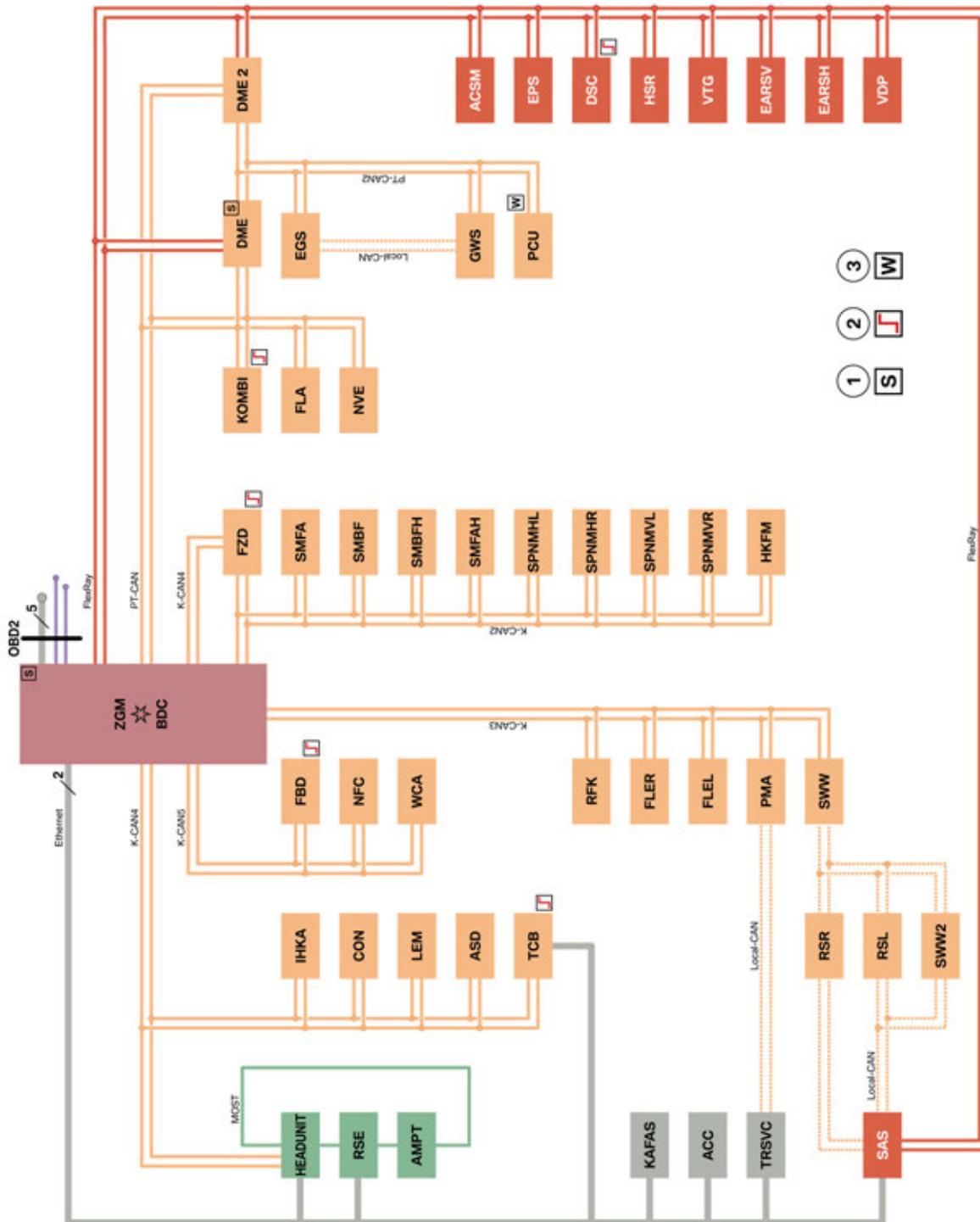
G12 Navigation System
2. System Overview

Abbreviation	Explanation
ACC	Active cruise control
ACSM	Crash Safety Module
AMPT	Amplifier Top (top high fidelity amplifier)
ASD	Active Sound Design
BDC	Body Domain Controller
CON	Controller
DME	Digital Motor Electronics
DSC	Dynamic Stability Control
EARSH	Electric active roll stabilization rear
EARSV	Electric active roll stabilization front
EGS	Electronic transmission control
EPS	Electromechanical Power Steering
FLA	High-beam assistant
FLER	Frontal Light Electronics Right
FLEL	Frontal Light Electronics Left
FZD	Roof function centre
GWS	Gear selector
HEADUNIT	Head Unit High 2
HKA	Automatic rear air-conditioning and heating
HKFM	Tailgate function module
HSR	Rear axle slip angle control
IHKA	Integrated automatic heating / air conditioning
KAFAS	Camera-based driver support systems
KOMBI	Instrument panel
LEM	Light Effect Manager
NFC	Near Field Communication
NVE	Night Vision Electronics
PCU	Power Control Unit
PMA	Parking maneuvering assistant
RFK	Reversing camera
RSE	Rear Seat Entertainment
RSL	Radar Sensor Left (avoidance assistant)
RSR	Radar Sensor Right (avoidance assistant)
SAS	Optional equipment system
SMBF	Seat module, passenger

G12 Navigation System

2. System Overview

Abbreviation	Explanation
SMFA	Seat module, driver
SMFAH	Seat module, driver, rear
SPNMHL	Seat pneumatics module back left
SPNMHR	Seat pneumatics module back right
SPNMVL	Seat pneumatics module front left
SPNMVR	Seat pneumatics module front right
SWW	Lane change warning (primary)
SWW2	Lane change warning (secondary)
TCB2	Telematic Communication Box 2; Telematic Control Unit 2
TRSVC	Control unit for rear view camera and SideView
VDP	Vertical Dynamic Platform
VTG	Transfer box
WCA	Wireless Charging tray
1	Start-up node control units for starting and synchronizing the FlexRay bus system
2	Control units with wake-up authorisation
3	Control units also connected at terminal 15WUP

G12 Navigation System

2. System Overview

2.1.2. Functional wiring diagram
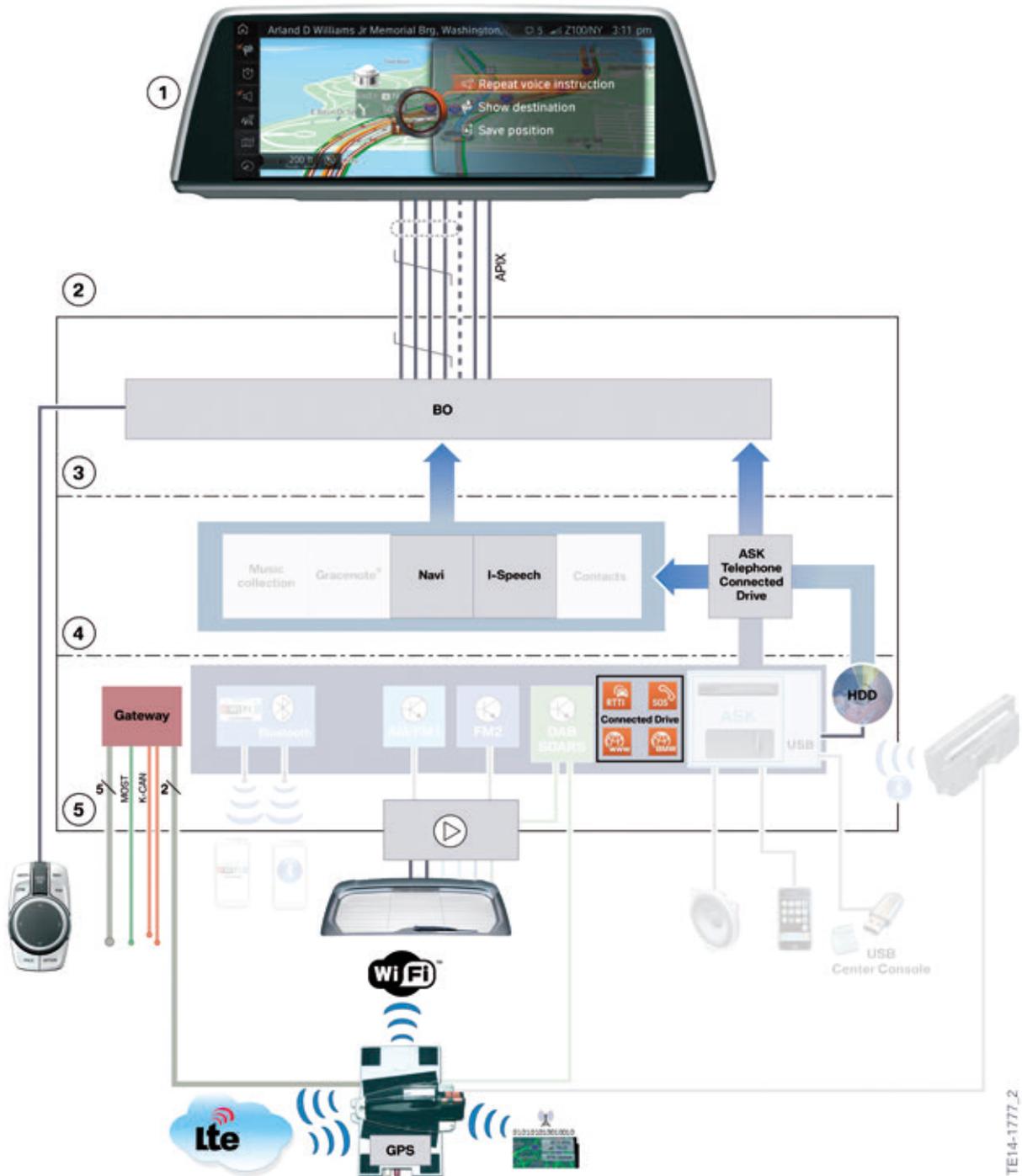
Functional wiring diagram for navigation system G12

G12 Navigation System
2. System Overview

Index	Explanation
1	Central Information Display (CID)
2	Head Unit High 2
3	User interface
4	Application/software
5	Interfaces/tuner/hardware connections

G12 Navigation System

2. System Overview

2.2. System wiring diagram

2.2.1. Navigation system

TE14-1712_2
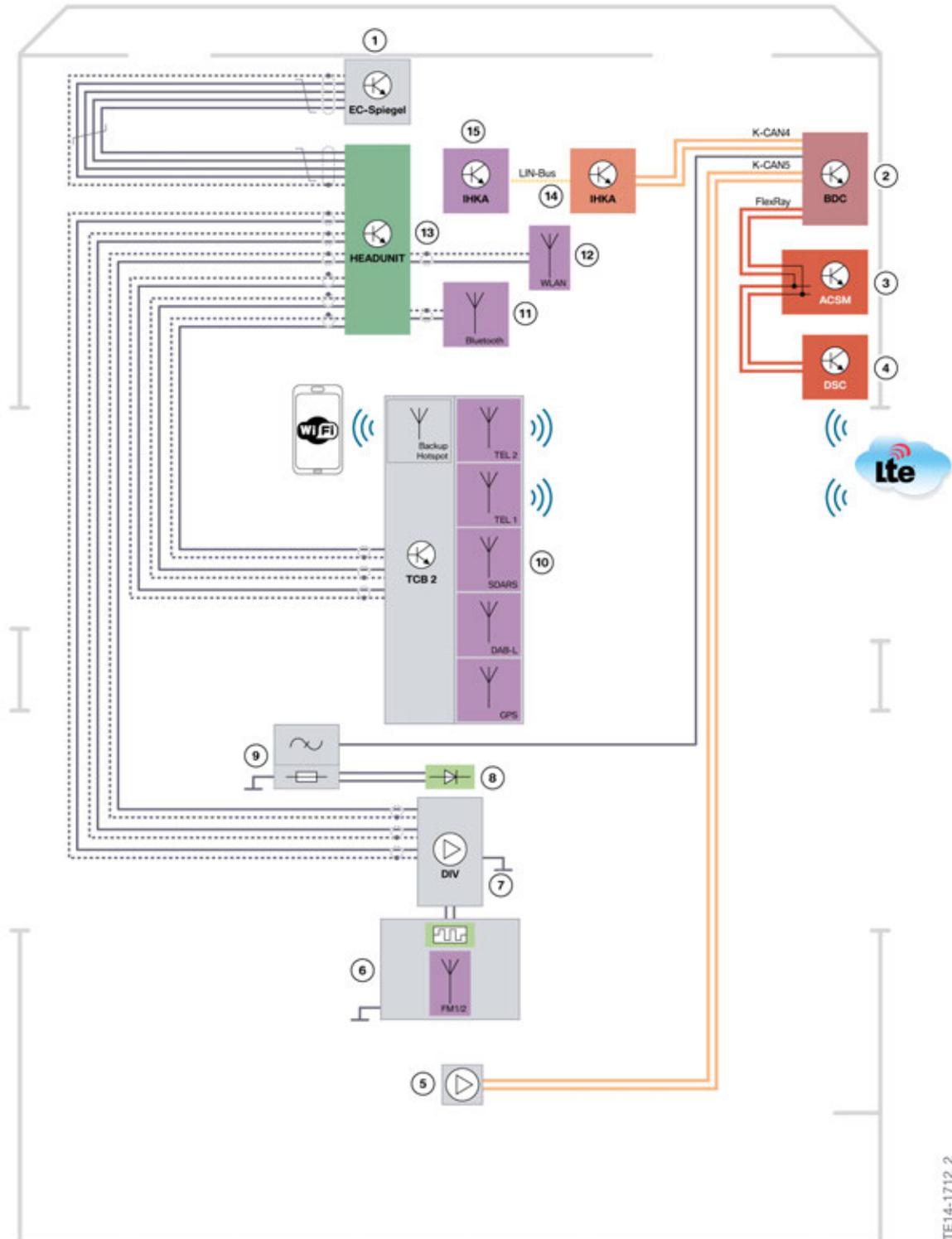
G12 Navigation System

2. System Overview

Index	Explanation
1	Electrochromatic mirror
2	Body Domain Controller (BDC)
3	Crash Safety Module (ACSM)
4	Dynamic Stability Control (DSC)
5	Remote control service receiver (FBD) (with K-CAN connection for first time)
6	Rear window diversity and antenna amplifier (FM/AM and FM2)
7	Rear window heating and antennas (FM/AM and FM2)
8	Additional brake light
9	E-filter against interference from additional brake light
10	Antenna system + control unit TCB2 for convenient telephone (SA 6NS) or Telephone with Wireless Charging (SA 6NW); snap-in roof-mounted antenna in the fin with SDARS (US), TEL1 (telephone), TEL2 (telematics) and GPS
11	Bluetooth antenna connected to the Head Unit High 2
12	Wi-Fi®Direct antenna connected to the Head Unit High 2
13	Head Unit High 2
14	Integrated automatic heating / air conditioning (IHKA)
15	IHKA control panel

G12 Navigation System
3. System Components

3.1. Introduction

The G12 has been extended by a number of functions with respect to **operation** of the navigation system in addition to the **newly designed Touch Controller**. The gesture recognition camera is not yet used for the navigation function at the series launch. However, a number of gestures for navigation are planned for the near future. The Central Information Display (CID) will already be equipped with a **touch display** at the series launch. All functions of the navigation system can be operated with this.

Input via the **voice processing system** promises a quantum leap forward. Here, embedded SVS (hard disk) or off-board SVS (BMW backend) is offered in combination (which is standard on US market G12 versions).

The GPS tuner for the navigation system was relocated to the **TelematicCommunication Box TCB2**. This was possible for the G12 since the TCB2 is included in the standard equipment in all vehicles of the BMW 7 Series.

The TCB2 is connected directly with the roof fin as a hardware component. You can find details on the TCB2 in the "G12 Telephone and telematic systems" training manual. The yaw rate sensor and longitudinal acceleration sensor have also been relocated and their signals are transmitted to the Head Unit High 2 via the bus system. An FM triple tuner is available for traffic information. This supplies RDS/TMC information to the head unit at regular intervals. If the customer has ordered the optional equipment Real Time Traffic Info RTTI (OE 6AM) via the ConnectedDrive Store or ex-works, this information is displayed in the G12 navigation system as additional traffic information with coloured messages and diversion recommendations.

The **navigation software with application and navigation map data** is again installed on a partition of the 200 GB hard disk in the Head Unit High. A new feature here above all is the automatic map update process in combination with a 3-year subscription for the customer.

Function	Components
Operation/display	
Gestures (not yet available for navigation at series launch)	Gesture recognition camera (OE 6U8)
Touch	Touch screen (OE 609; 601)
Touch	Touch Controller (standard equipment)
Rotate/press/slide	Touch Controller (standard equipment)
Language	Voice processing system (standard equipment)
Language	ConnectedDrive Concierge Services (OE 6AN) via the ConnectedDrive Telematic System TCB2
Extended displays	
Display, centre of vehicle	Central information display with touch screen (OE 609)
Display, driver's position	Instrument cluster standard equipment or multifunctional instrument display (OE 6WB)
Display, driver's position, raised	Head-up Display (SA 610)

G12 Navigation System

3. System Components

Function	Components
Navigation computer/navigation software	
Navigation application	Head Unit High 2 hard disk drive (HDD)
Navigation map data	Head Unit High 2 hard disk drive (HDD)
Sensor system/evaluation electronics	
GPS reception	GPS antenna in the roof fin
GPS tuner	GPS tuner in the TCB2
Yaw sensor	ACSM
Longitudinal acceleration	DSC sensor system

3.2. Operation/display

3.2.1. Controller

The controller (CON) in the G12 has a touch control panel and 7 direct access keys. A new feature is that the menus on the left side CD/Multimedia and have now been combined into **Media** . The telephone menu has moved from the right to the left side and is now called **COM** for communication.

By combining CD/Multimedia and Radio, space was created on the **right side of the controller** for another direct access key. There are now **2 buttons** on the right that can be used to access the navigation system:

- **"MAP"** to access the previous Map submenu of the navigation system.

- **"NAV"** to access destination input of the navigation system.

Controller G12 with installation location

G12 Navigation System

3. System Components

The two direct access keys for the navigation system on the controller

3.2.2. Central information display (CID)

With Navigation Professional (SA 609), a fixed 12.3" **touch screen** with a resolution of 1440 x 540 pixels has now been integrated on the central information display (CID).

Further information on the touch display is available in the "G12 Displays and Controls" training manual.

Touch display in the G12

The touch screen allows selection of all functions in the navigation system that can also be selected via the controller.

G12 Navigation System
3. System Components

3.2.3. Voice processing system (SVS)

The voice processing system (SVS) has been introduced for the first time in the G12. Using an off-board SVS database managed by an external provider, voice commands can now be processed directly by the system that were previously not understood. The language dialogue takes place as if you are having a conversation with a chauffeur and not with an electronic system.

The new feature is known as "natural language understanding" and the basic functions are already present on the hard disk drive in the head unit. Additional functions such as the recognition of Points of Interest (POIs), e.g. the Allianz Arena in Munich, Wembley Stadium in London or the Fontana di Trevi in Rome are recognized without problems by the system. However, the data connection to the provider mentioned above is necessary for this.

The voice processing system for the G12 will be offered in different quality levels. You can find out more details about this in Chapter 6.

Input destination POI Allianz Arena

3.3. Extended displays for navigation system

3.3.1. Instrument cluster and HUD

The Central Information Display (CID) as the only display element for navigation has long since been history. Today, additional display of navigation commands in the instrument cluster is part of the standard equipment. Extended functions can be found in the multifunctional instrument cluster (OE 6WB) and in the Head-Up Display (OE 610).

As the basic version, the navigation message field is shown in the standard instrument cluster on a TFT display inside the fixed engine speed display dial (TFT 8.8"; 1280 x 480 pixels).

G12 Navigation System
3. System Components

Instrument cluster G12

The different sizes of the two TFT displays are evident in the direct comparison with the multifunctional instrument cluster.

Comparison of the navigation display on the two instrument cluster versions G12

G12 Navigation System

3. System Components

Index	Explanation
1	Instrument cluster with fixed engine speed display dial (Not for US)
2	Multifunctional instrument cluster with larger TFT display (SA 6WB - Dynamic Digital instrument Cluster)

With the multifunctional instrument cluster (SA 6WB - Dynamic Digital instrument Cluster), the instrument dials for speed reading, engine speed display as well as fuel and engine temperature display are displayed fully electronically. This is made possible by a 12.3" TFT display with a resolution of 1920 x 720 pixels.

Due to the size of the TFT display, it is possible here to hide the electronic pointers with rpm digits if required and to display the High Guiding (auxiliary route arrows) on the complete right half of the instrument cluster.

If you wish to find out more about the two instrument clusters and modes, please refer to the "G12 Displays and Controls" training manual.

3.4. Navigation computer/navigation software

3.4.1. Navigation computer in the Head Unit High 2

The navigation software is stored on the hard disk drive of the Head Unit High. This means that the head unit is the navigation computer of the vehicle. The map material is also stored on the hard disk drive in the Head Unit High 2 (HU-H2).

A new feature is the fact that the complete sensor system of the navigation system has been decentralized and is now located in different control units of the G12. The processed navigation data from the GPS antenna and GPS tuner is sent by the Telematic Communication Box 2 to the Head Unit High 2 via the new OABR Ethernet bus system.

The data of the yaw rate sensor for the navigation system is provided by the Crash Safety Module (ACSM). In combination with the longitudinal acceleration data from the Dynamic Stability Control (DSC), this data is also transmitted to the Head Unit High 2 via FlexRay and BDC.

Installation location of the HU-H2

G12 Navigation System
3. System Components

3.4.2. Hard disk drive HDD and map update

The navigation application (navigation software) is integrated in the operating system of the HU-H2, which has a specified size of 4 GB. The hard disk partition for the navigation map material remains unchanged at 100 GB.

Since the map data is part of the head unit and its hard disk drive, the topic of map update is covered together with **the complete description of the Head Unit High 2** in the "G12 Audio system" training manual. The procedures for a FULL map update or partial update (automatic map update) are described there.


⚠️

With the automatic update function introduced for the first time in a BMW 7 Series, the complete data is not updated in the update process (example about 30 GB are needed for the of a Europe map); instead, only the current changes for each defined update area (a maximum of 350 MB) are updated.

For example: Germany cluster or Spain cluster, Italy cluster, etc.

G12 Navigation System

3. System Components
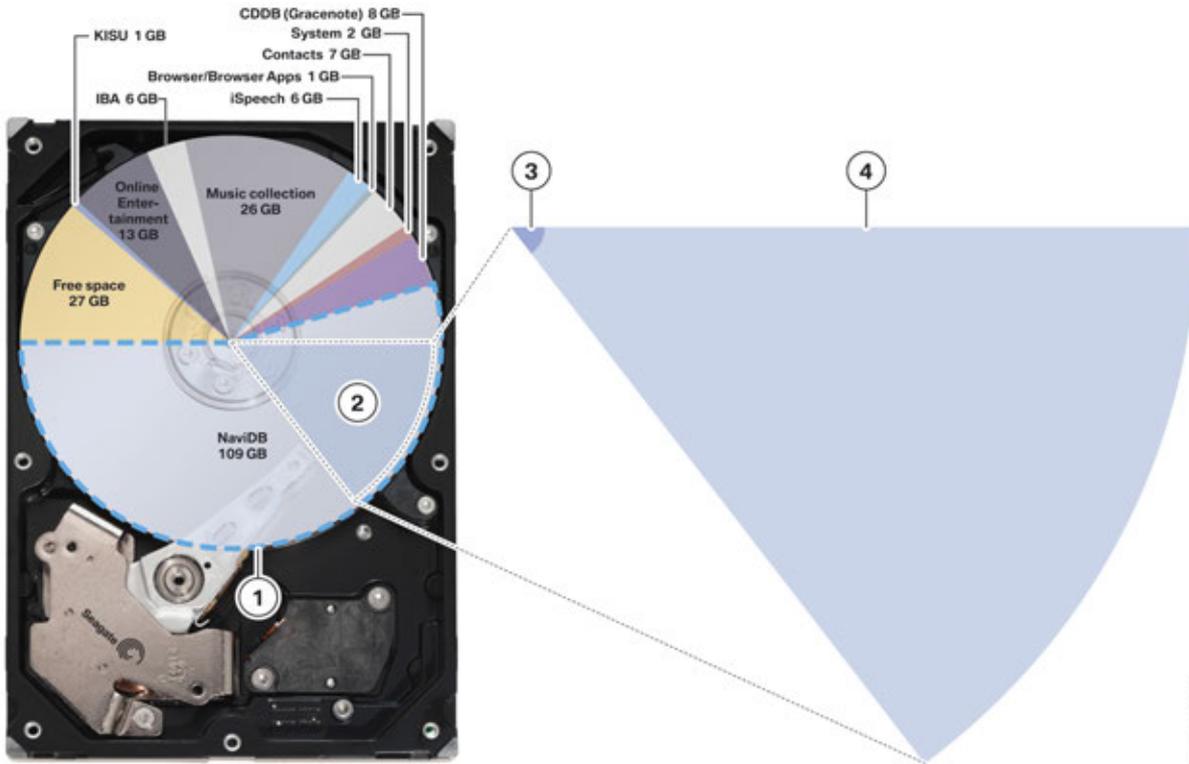
Partitioning of Head Unit High 2 example

1	**Navigation area of the hard disk drive (partition with 106 GB)**
2	Map data (example Europe: about 30 GB)
3	Streaming updates maximum of 350 MB every three months via "Automatic Map update"; according to the state, region of the customer (e.g. Germany)
4	Remaining map of Europe = (29.5 GB) which is not automatically updated

G12 Navigation System

3. System Components

3.5. Sensor system of the navigation system

Description	Sensor system/control unit
The data of the yaw rate sensor for the navigation system is provided by the Advanced Crash Safety Module (ACSM).	
The GPS antenna is located in the roof antenna (fin); the GPS receiver (GPS tuner) is accommodated in the Telematic Communication Box 2 and transmits the data to the Head Unit High 2 with the new OABR Ethernet.	
The DSC as the control unit for longitudinal dynamics determines the vehicle speed in combination with the speed sensors of the DSC system and transmits this to the BDC via FlexRay. From here, the information on the vehicle speed is distributed in the vehicle.	
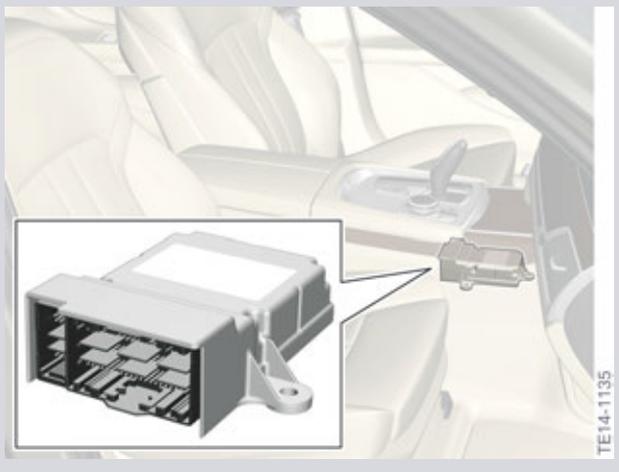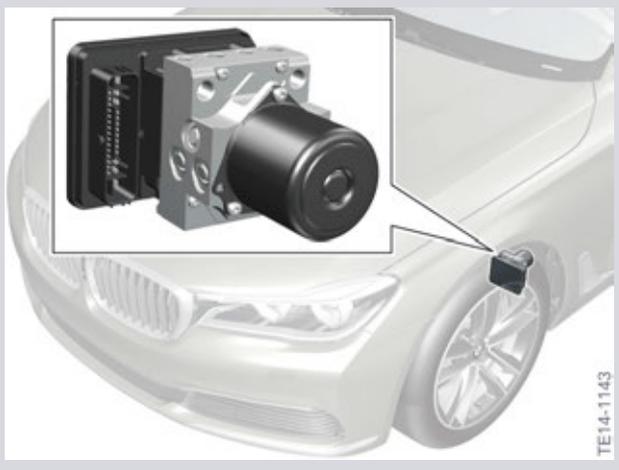
G12 Navigation System
4. Navigation Functions

4.1. Introduction

There are a host of new features for the **navigation system** in the G12. These relate to the areas of map view, destination input, display (guiding), routing and the special functions for navigation. The new features in particular for the navigation system in the G12 will be described below.

⚠️

The following is an overview the navigation system functions of the G12. You can find details of all functions, adjustment options and national-market versions in the Owner's Manual of the vehicle.

4.2. Selection and settings

4.2.1. Toolbar

The navigation map is displayed after selection of "MAP" by pressing the controller button. The toolbar is the central control element here. All settings can be activated from here. The individual submenus can be accessed via the controller or, as a new feature, via the **touch screen**. In addition, the split screen can be activated by pushing the controller to the right and pressing. You can find out more details about the split screen in Chapter.
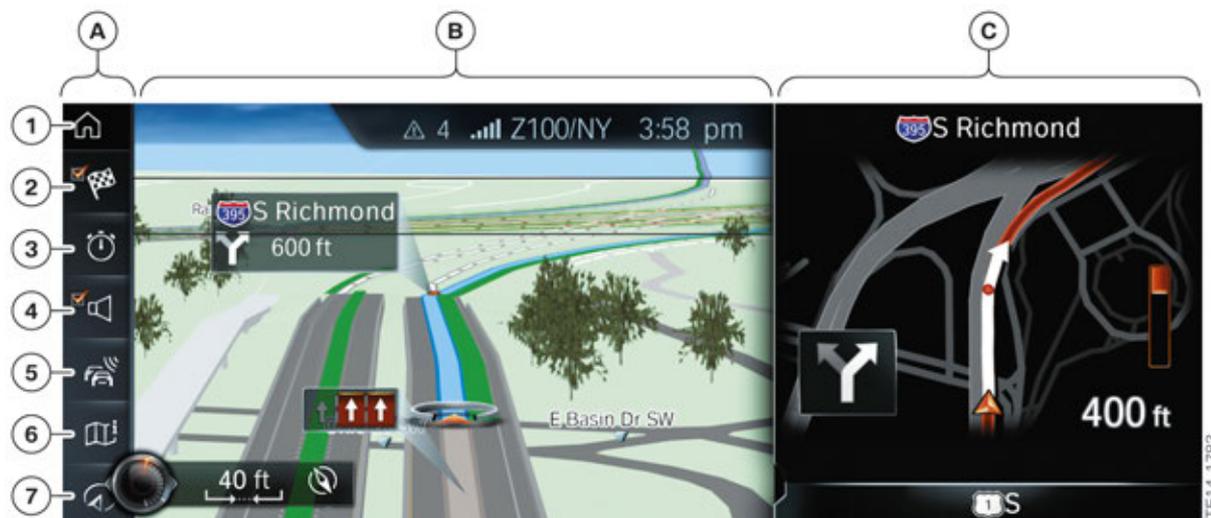
Navigation map with toolbar and with activated split screen

Index	Explanation
A	Toolbar
B	Reduced-size main screen
C	Split screen
Toolbar	
1	HOME button; return to main menu
2	Start/end route guidance

G12 Navigation System

4. Navigation Functions

Index	Explanation
3	Change current route
4	Switch spoken instructions on and off
5	Traffic information (including RTTI or TMC activity display)
6	Display additional information on map
7	Select map view
	Interactive map (not visible on illustration, customer must scroll down for this)

4.2.2. Map view settings

There are several options available in the Map views submenu for setting the map view.

With the "Auto zoom" function, for example, the next maneuver is focussed. In other words, the scale is chosen so that the next maneuver is displayed in the smallest possible scale. The maximum zoom factor is then 50 m.

The highlight is the "Auto zoom with info" function. Here, lane and turn information is integrated directly into the navigation map.

Overview of the individual setting options for map display:

Navigation submenu Map views

G12 Navigation System

4. Navigation Functions

Index	Explanation
1	Perspective
2	Heading up
3	North up
4	Auto zoom
5	NEW: Auto zoom with info
6	Manual zoom
7	"Map views" icon in the toolbar

In addition, the following map views can be selected in the toolbar under the "Additional information" icon.
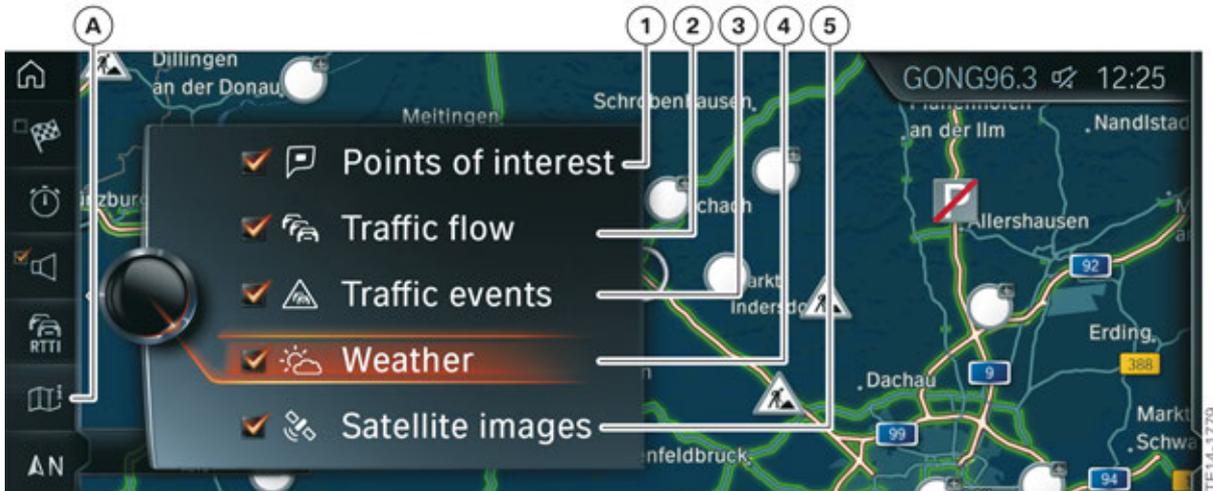
Navigation submenu Additional information

Index	Explanation
Toolbar	
A	Display additional information on map
Selection of additional information	
1	Points of interest (POIs)
2	Traffic flow
3	Traffic events
4	Weather in map
5	Satellite images

G12 Navigation System

4. Navigation Functions

In the option menu, it is additionally possible to select the following menu items in the "Settings" menu and "Map view settings" submenu:

- Map elements
- Map view
- Day mode/Night mode/Automatic mode

Additional map view option for map display in Day mode, Night mode and Automatic mode

Index	Explanation
1	Activation of Day mode
2	Activation of Night mode
3	Activation of Automatic mode

G12 Navigation System
4. Navigation Functions

4.2.3. Full-screen mode

The complete 12.3" screen diagonal is used in full-screen mode. A few examples of the display in full-screen mode of the navigation system are shown below.

Different map variants in the G12 in full-screen mode

Index	Explanation
1	Direction of travel map. Zoom: 10 miles
2	Direction of travel map. Zoom: 5 miles; satellite image active
3	Perspective map: Zoom 50 m, POIs shown

One of the highlights of the navigation system in the G12 is the so-called **Micro City Model**. Here, it is possible for the first time to reproduce the urban map view in a very detailed map image. The urban zoom function permits representation down to 10 m.

G12 Navigation System

4. Navigation Functions
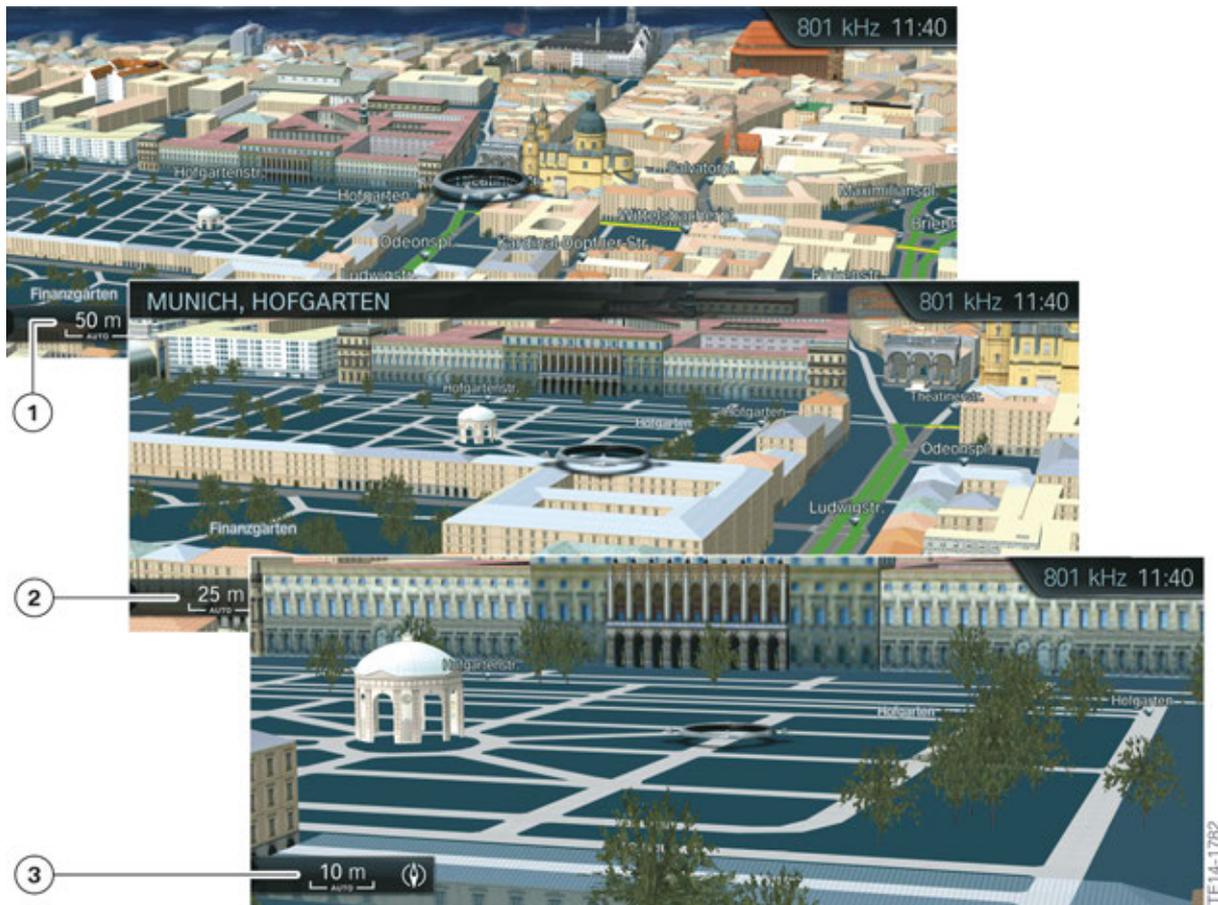
Micro City Map view

Index	Explanation
1	Zoom at 50 m (164 ft)
2	Zoom at 25 m (82 ft)
3	Zoom at 10 m (32 ft)

4.3. Destination input

The destination input has also been improved once more for the G12. The customer can choose whether he wishes to enter the destination by means of the controller or, by means of the (new) touch screen and input keyboard.

In addition, it is also possible to "drive" directly to the destination and select it in the "interactive map". This is also possible by means of the controller and touch screen.

Destination inputs are also possible via the voice processing system (SVS) and ConnectedDrive.

G12 Navigation System
4. Navigation Functions

4.3.1. Destination input by means of controller and touch screen

Input screens for destination input in G12

G12 Navigation System

4. Navigation Functions

Index	Explanation
1	**Touch Controller**
1a	Input by means of the speller displayed in the CID in combination with the controller by turning, pressing and pushing
1b	Input by means of the speller displayed on the CID in combination with writing on the Touch Controller
2	**Central Information Display (CID) with touch function**
2a	CID – Touch input by means of keypad on the screen

4.3.2. Direct input (interactive map and touch operation)

Touch operation on the interactive map

Index	Explanation
1	Activate interactive map in the toolbar
2	Select a destination by touch
3	Save the desired destination

G12 Navigation System
4. Navigation Functions

4.3.3. Voice processing system and ConnectedDrive

Voice processing system

The destination input function of the navigation system in the G12 was significantly improved by means of the **voice processing system (SVS)**. The voice processing system supports the customer by visual/acoustic feedback in the vehicle. After activation of the system at the "Push-to-talk" button on the multifunction steering wheel and a corresponding voice command by the customer, a new microphone symbol is displayed in the CID and instrument cluster.

Push-to-talk button on the multifunction steering wheel

A further innovation is the **off-board version** of the voice processing system via the SIM card permanently installed in the vehicle. Like with SIRI$^®$ from Apple$^®$ or the "Speech to text" function (Message Dictation by Nuance$^®$) familiar at BMW since 2012, the off-board SVS is processed by an external provider and transmitted back to the vehicle in seconds. You can find out about the differences between the individual embedded and off-board SVS versions in Chapter 5.

ConnectedDrive Concierge Services

Since the number of ConnectedDrive markets is constantly growing, an increasing number of functions can use these functions. After connection setup with an employee at **Concierge Services (SA 6AN in the US)**, this employee can send the destination requested by the customer directly to the vehicle.
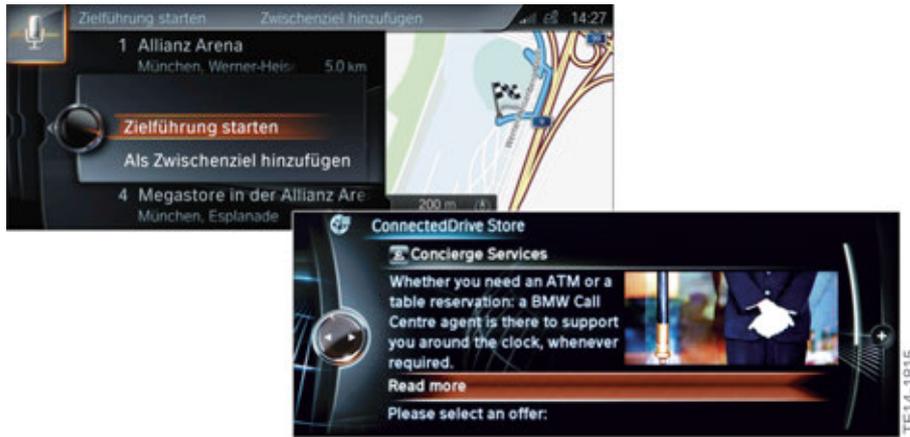
⚠️

Transmission of the address data to the vehicle takes place after the conversation with the service employee of the Concierge Service. If the customer disconnects immediately after the conversation, the address data cannot be transmitted to the vehicle!

G12 Navigation System

4. Navigation Functions

Microphone symbol after activation of SVS/ Concierge Services in the G12

4.4. Display (Guiding)

4.4.1. Split screen variants

The split screen was provided with 2 new and many familiar functions for navigation in the G12. As a highlight among the new functions, additional information is shown as a staggered roadbook in the **arrow display**.

G12 Navigation System

4. Navigation Functions

Split screen Roadbook option

Index	Explanation
1	Turn instructions
2	Route with additional road works information
3	Turn-off information and additional lane recommendation

The following are possible as additional displays in the arrow display:

- Turn instructions
- Traffic flow and traffic events
- Status information
- Next road
- Distance to next manoeuvre
- Driving lane information
- Current road

As a second innovation, a compass is displayed when the arrow display is active but **no** route guidance is active.

G12 Navigation System

4. Navigation Functions

4.4.2. Guiding in the instrument cluster

As described in Chapter 3, the inner display information of the engine speed display is hidden on both versions of the instrument cluster and the navigation content displayed here when route guidance is active. Turn recommendations, lane recommendations (Lane Guiding) and forward-looking route guidance (High Guiding) are then displayed on the right side of the TFT display.

Navigation display variants on the multifunctional instrument cluster in the G12

Index	Explanation
1	Turn instructions
2	Turn information with additional motorway information and Lane Guiding
3	Lane Guiding (driving lane recommendation) and High Guiding (forward-looking route guidance)

4.4.3. Guiding in the Head-Up Display

Guiding information is also shown on the Head-Up Display. The setting for this can be activated in the Vehicle settings menu under Head-Up Display. Details relating to the guiding information structure and the display shown on the Head-Up Display are provided in the "G12 Displays and Controls" training manual.

G12 Navigation System
4. Navigation Functions

4.5. Changing route (Routing)

4.5.1. Alternative routes

Online alternative routes

In addition to the familiar possibility of calculating "alternative routes" in the vehicle which are already stored in the vehicle, a new option has now been realized in the vehicle with the permanently installed SIM card, the online alternative route. The advantage of this is above all the **coverage of the off-board solution** or online alternative route: this is much greater than the embedded solution with navigation data from the hard disk drive.

The online alternative route function is coupled to ConnectedDrive services (SA 6AK) and **not** to the RTTI (SA 6AM).

With the online alternative route function, the route alternatives are already made available before the RTTI information is received since the BMW backend can access current provider data. This additional information for the online alternative routes is supplied after selection of the route in the vehicle. It is transmitted **directly** from the BMW backend to the TCB2 in the vehicle and then to the head unit.

This may lead to a situation where calculation of online alternative routes is faster than updating of RTTI in the vehicle.

The calculation of the optimum route is based on traffic forecasts. In other words, the further the route planning is from the current vehicle position, the greater the extent to which the forecasts of the online alternative route are taken into account in the vehicle instead of the Real Time Traffic Information. Online alternative routes are available for the entire map material, whereas RTTI is displayed above all locally in a radius of 50-100 km (30 - 60 mls) around the vehicle.
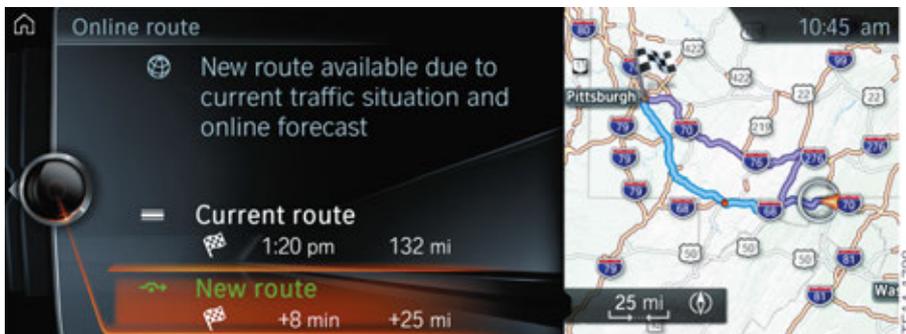
Online route

4.5.2. Changing the route manually

Route magnet

When route guidance is active, the route displayed on the map can be adapted manually. For this purpose, **a route magnet** is available for the first time in the G12. Using a marker point on the route, the customer can pull the route in the desired direction. Like on the interactive map, the corresponding point is displayed by means of cross-hairs. This cross-hairs can be moved via the controller or on the touch screen of the CID. After the customer has selected the desired route and confirmed this by pressing the controller, a corresponding "Accept magnet" message is displayed.

4. Navigation Functions

The route magnet can be selected in the submenu "Route" - "Change route" - "Add route magnet".

Route magnet in the G12

4.5.3. Route simulation

Aerial view

Using the aerial view function, it is possible to virtually fly over the route when the vehicle is stationary and route guidance is active, i.e to simulate the complete journey to the entered destination. This function can be selection in the submenu "Route" - "Aerial view". If the controller is then tilted to the left, additional functions and settings become visible.

Aerial view in the G12

G12 Navigation System

4. Navigation Functions

Index	Explanation
1	"Start" and "Stop" aerial view
2	Speed
3	Next route section
4	Previous route section
5	Jump to current position
6	Jump to destination

4.5.4. Avoid route

Areas to avoid

New, individual areas to avoid can be selected in the submenu "Settings" - Route settings"- "Areas to avoid". Areas to avoid can be places with a high crime rate, for example, or particularly poor roads which the customer wants to intentionally "avoid".

Selection of areas to avoid and subsequent activation

4.5.5. Learning navigation

By means of sensor systems

Using the sensor systems installed in the vehicle (KAFAS cameras, DSC sensor for longitudinal acceleration, yaw rate from the ACSM etc.), the saved navigation data is compared with the current road information. If the customer agrees, data relating to any detected deviations is sent back to the backend (BMW server) and all BMW customers can benefit from this measure. Transmission of this data is thus the further development of Floating Car Data, which has already been in use since 1999

G12 Navigation System

4. Navigation Functions

in order to improve the traffic flow. The improved map information is passed on by BMW to the map supplier who can then correct his maps on the basis of this feedback. However, there is no direct improvement of the data on the hard disk drive in the vehicle.
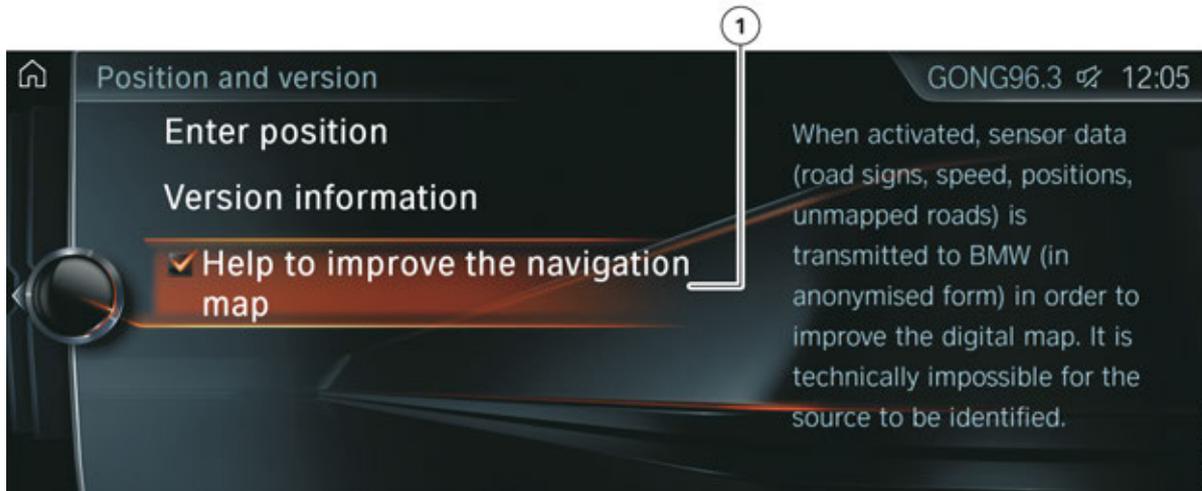

Improvement of map data by means of vehicle sensors

Index	Explanation
1	Agreement of the customer to participate in improvement of map data by means of vehicle sensor systems

By means of customer interaction

The customer can also intervene directly in the algorithm of his navigation system. The learning function of the navigation makes this possible. The customer can activate the function after selection in the submenu "Settings" - "Route settings" - "Learn route". If the customer intentionally deviates from the proposed route several times at the same place, this deviation is stored and taken into account in future route planning.
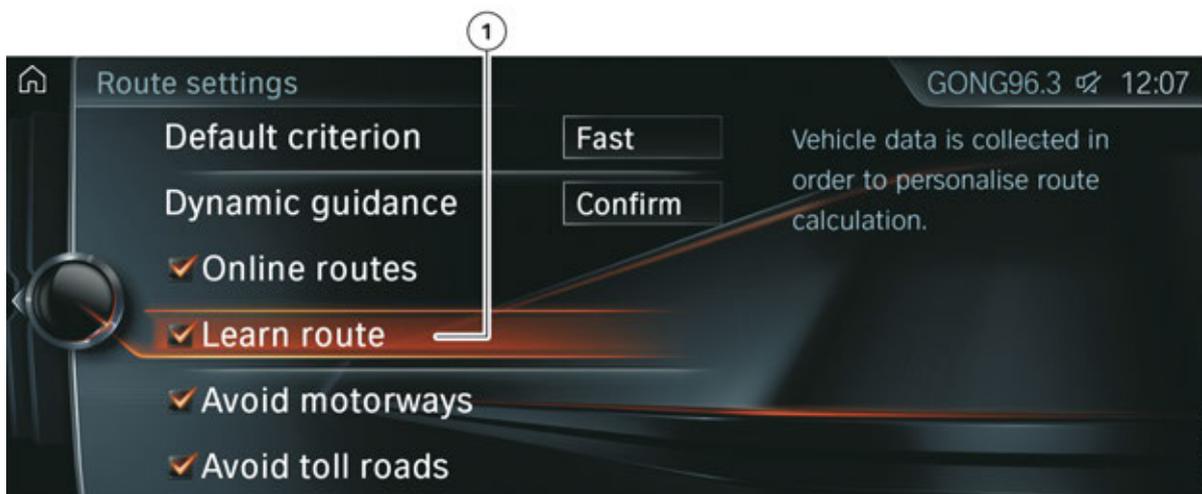
Activation of the "Learn route" function

| Index	Explanation
1	Activation of "Learn route"

4.6. Special functions

4.6.1. Activation points of camera system

With the introduction of the 180° Panorama View camera in the front of the G12. a new function was also defined for the navigation system. This new function permits targeted selection of activation points for automatically switching on the panorama camera. In this way, the customer can make hazardous points on his route safer by making road areas that are particularly difficult to see visible with the camera system.

Activation

The customer activates this function in the menu "Vehicle settings" and the submenu "Parking".
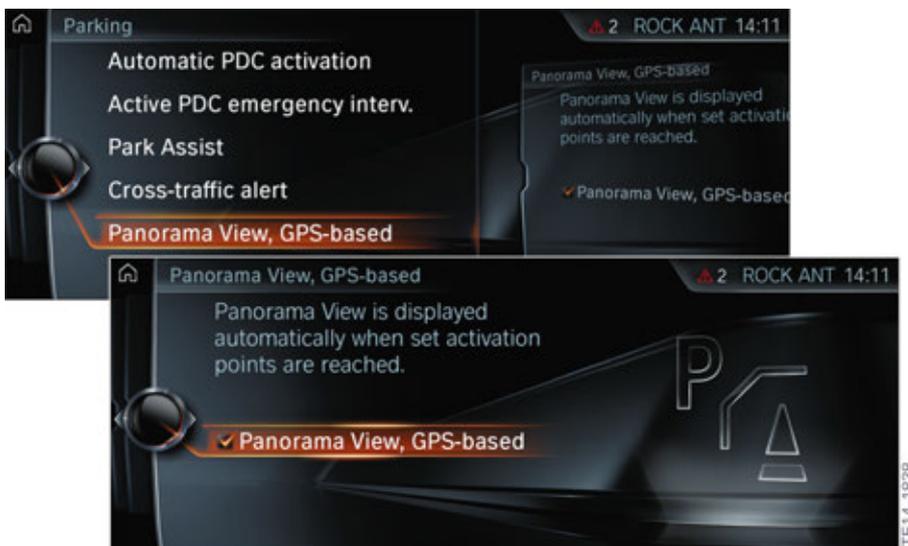
Activation of Panorama View function

Setting the activation points

The customer can activate a selection menu after activation of the Panorama View camera. In this selection menu it is possible to add, display or delete activation points.

G12 Navigation System

4. Navigation Functions

Adding an activation point for the Panorama View function

Index	Explanation
1	Panorama View camera in the front of vehicle
2	Adding an activation point

You can obtain further information on the Panorama View camera in the "G12 Assistance systems" training manual.

4.6.2. Journey planner

Like in the previous navigation system Professional, the G12 navigation system also includes a journey planner. The representation of the individual intermediate destinations has been improved here.

G12 Navigation System

4. Navigation Functions

Journey planner with intermediate destinations

It is possible to change the sorting of the individual intermediate destinations in the Options menu.

Changing the sorting order

Index	Explanation
1	Changing the sorting order of the journey planner
2	Selected town for changing the destination order in the journey planner

G12 Navigation System

4. Navigation Functions

4.6.3. Quick search

The customer can find the new function "Quick search" under "Navigation" – "Other input options". The Quick search function allows the customer to enter a letter string to search for Points of Interest and addresses either online (with active ConnectedDrive contract) or in the navigation data stored on the hard disk drive in the vehicle. All entries are shown that contain this letter string.

For Points of Interest, enter the name of the POI, e.g. "Allianz Arena".

In the case of an address, it is possible to simultaneously search for a town and road. This is done by entering a letter string of the place name, then a space and a letter string of the road name.

In addition, it is also possible to activate the voice processing system in the Quick search function.

Quick search similar to Google® search

G12 Navigation System
5. Voice Processing System (SVS)

5.1. History

A **voice control system** was offered for the first time in **1998** in the E38 **(note that not all the dates sited here coincide with the function introduction dates in the US market)**. This allowed the driver to operate the telephone and navigation system without taking his eyes off the traffic conditions. As part of further development of the voice processing system, the number of spoken commands increased significantly in the following versions from the initial **30** commands.

In **2003**, the number of **spoken commands** grew to around **470.** This increase took place with the introduction of the first head unit with the navigation system Professional, the CCC for E63/E64 and E60.

For the interface box ULF-SBX-High in the year **2007** , the **voice input system High**, now already referred to as **voice processing system (SVS)**, was consistently enhanced. At this time, it was already possible to control communication, navigation, assistance window, on-board information, entertainment, climate and setting by means of voice commands. When the voice processing system High with a ULF-SBX-High was installed, it was possible to switch between **2 languages**. Only one language was available with the head unit CCC.
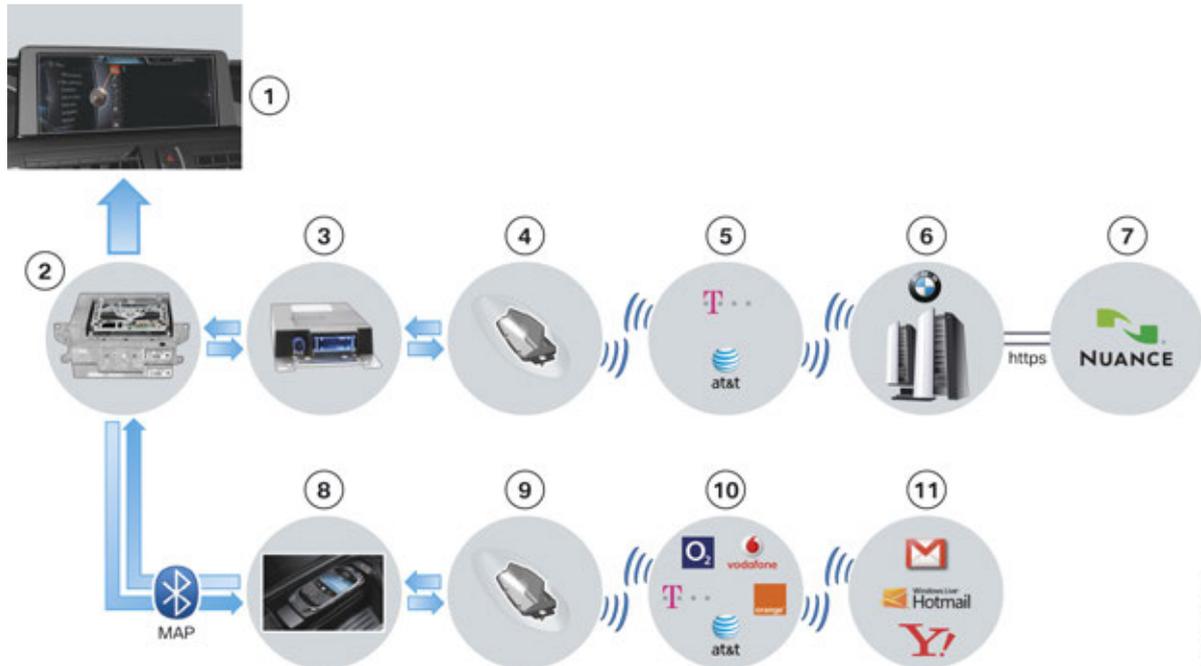
With the introduction of the head unit with 2nd generation Professional navigation system, the CIC, in **2008,** the voice processing system High was installed on a part of the internal hard disk drive (HDD). This meant that over 1000 voice commands and 8 languages were then available. The language settings could be changed in the "Settings" menu.

In **2010** , the voice processing system SVS in the CIC was further enhanced. The so-called "One Shot" input was introduced in the navigation system. From now on, it was possible to enter the town, road and house number in the system in a coherent sentence. This data was then entered jointly in the system.

The last major new development was in **2012** with the introduction of the Head Unit High (HU-H) (3rd generation head unit with Professional navigation). The function "Message Dictation - Speech to text" allowed voice commands to be sent to an external provider for the first time. The speech was converted by the provider into text and the text modules then sent back to the head unit for further processing. From here the text was sent to the CID for display. The text could then be sent as an SMS text message or e-mail via a Bluetooth-paired customer mobile phone (MAP profile). This function could be found under the menu item Office, submenu "Compose".

G12 Navigation System

5. Voice Processing System (SVS)

Message Dictation from 2012 with the introduction of the F01 LCI

Index	Explanation
1	Central information display
2	Headunit High
3	TCB
4	Roof fin with telematic antenna
5	Providers in 2012
6	BMW backend
7	Nuance® data provider
8	Customer's mobile phone
9	Mobile radio antenna in roof fin
10	Provider of the customer's mobile phone
11	Customer's e-mail provider

5.2. New development/further development

5.2.1. Introduction

A main application area for the **voice processing system (SVS)** with its embedded (hard disks) and off-board (BMW cloud backend) services is navigation. That is why the topic of SVS, which has hardware components distributed throughout the vehicle, is covered in this training manual. You can find out about the new and distinguishing features in the area of embedded/off-board SVS and natural language understanding below.

G12 Navigation System
5. Voice Processing System (SVS)

The voice processing system SVS used in the G12 has enhanced quality. Due to a new off-board database, voice commands can now be processed which could not be processed before. The SVS interacts as if you are talking to a chauffeur and not to an electronic system. A new kind of **natural language** communication between man and machine has now arrived in the G12.
The voice processing system is offered in different quality levels.

An interesting highlight of the new SVS system is the "Barge-In function". "Barge in" in this context means to interrupt the dialogue. It allows the customer to intervene directly in the speech dialogue without waiting for the response from the SVS. The new voice command then cancels the old voice command and the new voice command/speech dialogue is processed immediately.

Going forward, the system will also be able to evaluate and process whole sentences (like SIRI$^®$ from Apple$^®$). It is no longer designed purely for recognition based on syntax (sentence structure). This function is embedded on the hard disk partition for the SVS on the Head Unit High 2. In Marketing, this system is referred to as Intelligent Voice Assistant.

5.2.2. Natural language understanding applications

ConnectedDrive markets

There are 2 functions using SVS off-board functionality for ConnectedDrive markets.

1. Message Dictation: The first version includes only Message Dictation ("Speech to Text function"). There are improved functions for the customer here with a simpler procedure. Whereas the customer previously had to register separately with the provider Nuance$^®$ for initial activation, this is now included in the ConnectedDrive Service (OE 6AK) and the customer can use the function in the vehicle as long as the ConnectedDrive function is active. He can then extend the function in the ConnectedDrive store.

Input of an SMS text message via voice processing system

The following languages are available as Message Dictation languages for the G12 at the series launch:

G12 Navigation System
5. Voice Processing System (SVS)

- German

- US English

- UK English

- French

- Italian

- Spanish

- Japanese

- Korean

- Chinese

**2. Offboard SVS version 2 (Off-board Voice Processing):**

As described for Message Dictation, the customer receives the functions via the ConnectedDrive Services (OE 6AK) in combination with the permanently installed, activated SIM card in the TCB2. In Marketing, this system is referred to as Off-board Voice Processing. The difference here is that in addition to Message Dictation (Off-board 1), the commands of the **complete voice processing system** are also processed via the Nuance$^®$ server and it is now possible to work with **natural language commands**:

The so-called **NLU function** (NLU = Natural Language Understanding).

The advantage of this is that the search for points of interest (POIs) or entertainment sources can be narrowed down with the data processing performance of the Nuance$^®$ server, thereby permitting faster recognition. For example, when carrying out a POI search, the voice command: "Drive me to Wembley Stadium" will be recognized with an active ConnectedDrive contract.

G12 Navigation System

5. Voice Processing System (SVS)
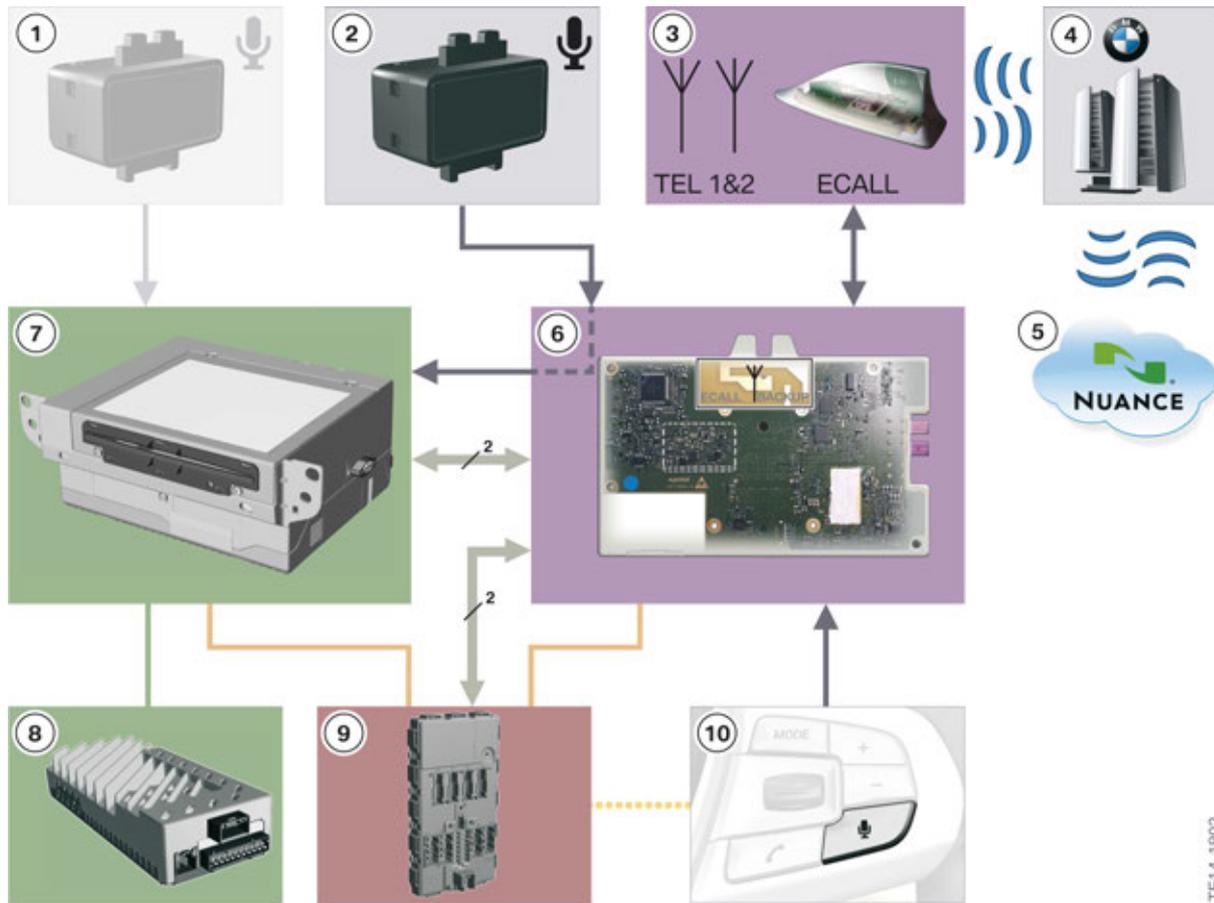
SVS G12

Index	Explanation
1	Microphone, passenger's side (not used for SVS)
2	Microphone, driver's side
3	Telematic antenna and telephone antenna (telematics 2 for LTE)
4	BMW backend server
5	Nuance® language services
6	Reception electronics in the TCB2
7	Head Unit High 2 (HU-H2)
8	Connection to hi-fi system in G12
9	Body Domain Controller (BDC)
10	Push-to-talk button